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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,110	06/15/2006	Yoshikazu Tanaka	47237-5008-00-US	4016

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EXAMINER	
BAUM, STUART F	

ART UNIT	PAPER NUMBER
1638	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/583,110	TANAKA ET AL.	
	Examiner	Art Unit	
	STUART F. BAUM	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *10,11 and 18-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 12-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/15/06, 4/13/07, 4/26/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-20 are pending.

2. Applicant's election without traverse of Group I, claims 1-9 (in part) and 12-17, in the reply filed on 6/11/2009 is acknowledged.

Claims 10-11 and 18-20 are withdrawn from consideration for being drawn to non-elected inventions.

3. Claims 1-9 and 12-17 including SEQ ID NO:1 encoding SEQ ID NO:2 are examined in the present office action.

Information Disclosure Statement

4. The information disclosure statement filed 4/13/2007 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because each publication listed in an information disclosure statement must be identified by publisher, author (if any), title, relevant pages of the publication, *date*, and place of publication. In the instant IDS, dates are missing from the reference citations. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Claim Objections

5. Claims 2-5 and 7 are objected to for being drawn to a non-elected invention.

Claims 2-7, line 1, are objected to for reciting "A" instead of --The--.

Claim 8 is objected to for reciting "a gene" instead of --the gene--.

Claim 9 is objected to for reciting "a vector" instead of --the vector--.

Claim 12, line 1, is objected to for reciting "a gene" instead of --the gene--.

Claim 14, line 2, is objected to for reciting "a gene" instead of --the gene--.

Claim 15, line 2, is objected to for reciting "a gene" instead of --the gene--.

Claim 16 is objected to for reciting "A" instead of --The--.

Claim 17, line 1, is objected to for reciting "a gene" instead of --the gene--.

Claim 12, line 3 is objected to for misspelling "vegetatively".

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 14 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 provides for the use of the gene according to claim 1, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 14 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The preamble of claim 17 recites "A method of introducing and expressing a gene.." but no method steps are recited.

Written Description

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1, 3-9 and 12-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are drawn to a gene coding for a protein having activity of transferring a sugar to the chalcone 4'-position, or wherein the gene hybridizes to all or a portion of SEQ ID NO:1

under conditions of 5 x SSC at 50^{O}C, or wherein the gene encodes SEQ ID NO:2 with modification of one or a plurality of amino acids that are added, deleted and/or substituted, or wherein the gene hybridizes to DNA comprising all or a portion of SEQ ID NO:1 under stringent conditions, or wherein the gene is derived from the family Scrophulariaceae, or from *Antirrhinum majus* or *Linaria bipartite*; or vector, host cell, plant or method comprising said gene or wherein the method includes a gene encoding an aureusidin synthase.

Applicants isolated their invention from a cDNA library constructed from flower petal tissue of Antirrhinum majus variety Butterfly yellow (page 18, Example 1). Applicants designed probes and primers from conserved regions of five GT amino acid sequences from morning glory, petunia, verbena, Scutellaria baicalensis and gentian (pages 18-19, Example2). Clones were isolated and one particular one, pSPB1725, contained a 1374 bp translation region coding for a 457 amino acid polypeptide whose sequence is set forth in SEQ ID NO:2 (page 24, top paragraph). Applicants assayed the product produced by the encoded protein which was THC 4'-glucoside (pages 24-26, Example 5). Applicants disclose the gene sequence of SPB1725 is set forth in SEQ ID NO:1 (paragraph bridging pages 23-24).

The Applicants do not identify essential regions of the protein encoded by SEQ ID NO:1, nor do Applicants describe the genus of polynucleotide sequences encoding a protein having activity of transferring a sugar to the chalcone 4'-position. Applicants also do not identify essential regions of any aureusidin synthase nor do they describe the genus of polynucleotides that encode any aureusidin synthase.

The Federal Circuit has recently clarified the application of the written description requirement to inventions in the field of biotechnology. See University of California v. Eli Lilly

and Co., 119 F.3d 1559, 1568, 43 USPQ2d 1398, 1406 (Fed. Cir. 1997). In summary, the court stated that a written description of an invention requires a precise definition, one that defines the structural features of the chemical genus that distinguishes it from other chemical structures. A definition by function does not suffice to define the genus because it is only an indication of what the gene does, rather than what it is. The court goes on to say, "A description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to members of the genus, which features constitute a substantial portion of the genus." *See University of California v. Eli Lilly and Co.*, 119 F.3d 1559; 43 USPQ2d 1398, 1406 (Fed. Cir. 1997).

Applicants fail to describe a representative number of polynucleotide sequences encoding a protein falling within the scope of the claimed genus of polynucleotides which encode any protein having activity of transferring a sugar to the chalcone 4'-position wherein the sequence hybridizes under stringent conditions to SEQ ID NO:1 or encodes any protein having the sequence of SEQ ID NO:2 with a modification of one or a plurality of amino acid additions, deletions, substitutions. Applicants also do not describe a representative number of polynucleotide sequences encoding any aureusidin synthase. Applicants only describe a single sequence of SEQ ID NO:1. Furthermore, Applicants fail to describe structural features common to members of the claimed genus of polynucleotides. Hence, Applicants fail to meet either prong of the two-prong test set forth by *Eli Lilly*. Furthermore, given the lack of description of the necessary elements essential for the protein encoded by SEQ ID NO:1 or any aureusidin synthase, it remains unclear what features identify said proteins. Since the genus of said

proteins has not been described by specific structural features, the specification fails to provide an adequate written description to support the breath of the claims.

Enablement

8. Claims 1-9 and 12-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The claimed invention is not supported by an enabling disclosure taking into account the *Wands* factors. *In re Wands,* 858/F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988). *In re Wands* lists a number of factors for determining whether or not undue experimentation would be required by one skilled in the art to make and/or use the invention. These factors are: the quantity of experimentation necessary, the amount of direction or guidance presented, the presence or absence of working examples of the invention, the nature of the invention, the state of the prior art, the relative skill of those in the art, the predictability or unpredictability of the art, and the breadth of the claim.

The claims are drawn to a gene coding for a protein having activity of transferring a sugar to the chalcone 4'-position, or wherein the gene encodes SEQ ID NO:2, or wherein the gene hybridizes to all or a portion of SEQ ID NO:1 under conditions of 5 x SSC at 50^{O}C, or wherein the gene encodes SEQ ID NO:2 with modification of one or a plurality of amino acids that are added, deleted and/or substituted, or wherein the gene hybridizes to DNA comprising all or a portion of SEQ ID NO:1 under stringent conditions, or wherein the gene is derived from the

family Scrophulariaceae, or from *Antirrhinum majus* or *Linaria bipartite*; or vector, host cell or plant comprising said gene or method for transferring a sugar to the chalcone 4'-position using said gene or method of introducing and expressing said gene together with a gene coding for aureusidin synthase in a plant to alter the flower color to yellow.

Applicants isolated their invention from a cDNA library constructed from flower petal tissue of *Antirrhinum majus* variety Butterfly yellow (page 18, Example 1). Applicants designed probes and primers from conserved regions of five GT amino acid sequences from morning glory, petunia, verbena, *Scutellaria baicalensis* and gentian (pages 18-19, Example2). Clones were isolated and one particular one, pSPB1725, contained a 1374 bp translation region coding for a 457 amino acid polypeptide whose sequence is set forth in SEQ ID NO:2 (page 24, top paragraph). Applicants assayed the product produced by the encoded protein which was THC 4'-glucoside (pages 24-26, Example 5). Applicants disclose the gene sequence of SPB1725 is set forth in SEQ ID NO:1 (paragraph bridging pages 23-24).

Applicants have not reduced to practice their invention. Applicants have not transformed any plant with a nucleic acid encoding any protein that transfers a sugar to the chalcone 4'-position to produce a plant with a useful agronomic phenotype. The state-of-the-art teaches transforming a plant with a protein whose activity is to transfer a sugar to the chalcone 4'-position produces unexpected results. Ono et al (2006, PNAS 103(29):11075-11080) disclose transforming a Torenia plant with a construct comprising a nucleic acid molecule encoding *Antirrhinum majus* UDP-glucose:chalcone 4'-O'glucosyltransferase (*Am*4'CGT) did not alter the flower color (page 11077, right column, bottom paragraph).

The state-of-the-art is such that one of skill in the art cannot predict which nucleic acids that hybridize to SEQ ID NO:1 will encode a protein with the same activity as a protein encoded by SEQ ID NO:1. The prediction of protein structure from sequence data and, in turn, utilizing predicted structural determinations to ascertain functional aspects of the protein, is extremely complex, and the positions within the protein's sequence where amino acid substitutions can be made with a reasonable expectation of maintaining function are limited (Bowie et al, Science 247:1306-1310, 1990, see especially page 1306). Proteins may be sensitive to alterations in even a single amino acid in a sequence. For example, the replacement of a glycine residue located within the START domain of either the PHABULOSA or PHAVOLUTA protein receptor with either an alanine or aspartic acid residue, alters the sterol/lipid binding domain (McConnell et al, Nature 411 (6838):709-713, 2001, see especially page 710, left column, 2nd paragraph).

Applicants have not disclosed how one makes or isolates any of the sequences that are encompassed by Applicants' broad claims. Applicants have not taught which regions of the respective polynucleotides can be used to amplify any of said polynucleotides or which regions can be used as a probe to isolate any of said polynucleotide sequences. Therefore, the instant specification fails to provide guidance for which amino acids of the protein encoded by SEQ ID NO:1 can be altered, the type of alteration, and which amino acids must not be changed, to maintain activity of the encoded protein. The specification also fails to provide guidance for which amino acids can be deleted and which regions of the protein can tolerate insertions and still produce a functional protein.

Re: claim 14; because of the indefiniteness of the claim as discussed above, and because Applicants have not disclosed how one of ordinary skill in the art would use a chalcone molecule

with a sugar on the 4' position, and because of the issues discussed above, the claim is not enabled.

Re: claim 17; because of the indefiniteness of the claim as discussed above, and because of the issues discussed above, the claim is not enabled.

Re: claim 17; it is unclear from applicants' disclosure the starting materials, method steps and results of transforming a plant with a construct comprising the gene of claim 1 and a gene encoding a aureusidin synthase.

In the absence of guidance, undue trial and error experimentation would be required for one of ordinary skill in the art to screen through the multitude of non-exemplified sequences, either by using non-disclosed fragments of SEQ ID NO:1 as probes or by designing primers to undisclosed regions of SEQ ID NO:2 and isolating or amplifying fragments, subcloning the fragments, producing expression vectors and transforming plants therewith, in order to identify those, if any, that when over-expressed produce a plant with a useful agronomic phenotype.

Therefore, given the breadth of the claims; the lack of guidance and examples; the unpredictability in the art; and the state-of-the-art as discussed above, undue experimentation would be required to practice the claimed invention, and therefore the invention is not enabled.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. Claim 9 is rejected under 35 USC 101 because the claimed invention is directed to non-statutory subject matter.

The claim recites "Host cells transformed" which reads on a human being. Amending the claim to recite "An isolated host cell transformed" will obviate the rejection.

Claims 12-13 and 15-16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The rejection includes dependent claims.

Claims 12 and 15 are drawn to progeny of the transformed plant. Due to Mendelian inheritance of genes, a single gene introduced into a parent plant would only be transferred at most to half the male gametes and half the female gametes. This translates into only three quarters of the progeny having at least a single copy of the transgene and one quarter of the progeny would not carry a copy of the transgene. Given that there is no indication that there would be any other distinguishable characteristics of the claimed progeny (seeds), it is unclear whether the claimed progeny (seeds) would be distinguishable from progeny (seeds) that would occur in nature. See *Diamond v. Chakrabarty*, 447 U.S. 303 (1980), *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 76 USPQ 280 (1948), and *In re Bergy , Coats, and Malik* 195 USPQ 344, (CCPA) 1977. The amendment of the claims to recite that the progeny (seeds) comprise the gene that was introduced into the parent would overcome the rejection.

Claims 1-7 and 12-17, are directed to non-statutory subject matter. This rejection is made because the claims are drawn to "A gene" which does not indicate that the "hand of man" was involved in the invention. Amending the claim to recite "isolated" will obviate the rejection.

10. No claims are allowed.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stuart F. Baum whose telephone number is 571-272-0792. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached at 571-272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Stuart F. Baum/
Stuart F. Baum Ph.D.
Primary Examiner
Art Unit 1638
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